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# EP 1208495:
# PROCESS FOR DETERMINING OBJECT
# LEVEL PROFITABILITY

- Data Sheet
- Application (text)

## Data Sheet

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    PROCESS FOR DETERMINING OBJECT LEVEL PROFITABILITY

## Application

- Description
- Claims

## Description

Description

PROCESS FOR DETERMINING OBJECT
LEVEL PROFITABILITY
BACKGROUND OF THE INVENTION

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The process of measuring profit is an important business activity.
Profit measures are the primary basis for understanding financial
performance and value creation in a business. Once a business is owned
publicly, an independent review of a firm's financial position becomes
a mandatory process well known as measuring profit according
to"generally accepted accounting principal" (GAAP.) While these
standards and regulations are adequate for an external view of a
company's financial condition, the measurement of profit contribution
amongst the business is required for proper management of the
franchise. Internal financial performance measurement is especially
complex for a multi-product, multi-location, and/or large customer
based businesses. The use of intemal financial performance measures
drives most businesses planning processes, management incentive
processes and control processes. Many businesses have found that
internal profit measures can be consistent with the external financial
statement measures. These businesses implement internal accounting
processes consistent with external measures using common metrical
units similar to a GAAP Financial Statement presentation-a consistent
metric or"yard stick" (i. e. numerically the sum-ofthe-profit-parts
equals the whole company's profit according to GAAP.)
Many businesses today are struggling to accurately measure profit
contribution at a level necessary to accurately measure profit
contribution of individual customer interactions. The reason for
dilemma is found in the manner in which generally accepted accounting
principles are applied.
Fundamental accounting theory takes lumpy cash flows that occur in the
day-to-day management of a business conducted with its customers and
transform them into smoothed income or expense items (known as
accruals.)
At the end of every profit reporting cycle these income and expense
items are consolidated into a period end balance sheet and income
statements. Reports on the state of the business can then be presented
by accountants in formats necessary for the independence of ownership
and management that is the basis of capital markets. Indeed, most
businesses today would call its accounting process critical for
survival. Unfortunately, the complexity of maintaining an accurate
financial accounting process has obscured the measurement of profit
contribution at a very detailed level. While the aggregate cash flows
of a large company are relatively stable the individual
customer-to-business cash flows are very volatile. Accounting practice
to date
has been comfortable with using aggregate cash flow information for
the accrual accounting process. The accounting process based on
aggregates
has lead to blindness by businesses of incremental customer profit
contribution measures necessary to implement customer level decision
making, particularly in large businesses with many millions of
customers.
General Ledgers (double entry book keeping systems) were early
adapters of automated data processing solutions due to the match
between
computing capabilities of computers and the execution of the
accounting
process. The benefit, from reduced cost for accounting processes
easily
justified large expenditures in information processing technology,
both in
hardware and in software development. The complexity of today's
general
ledger applications and the age of these systems have retarded the

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innovation
of new automated techniques taking advantage of technological advances
in
massively parallel computing capability.
References describing generally accepted accounting principals and
procedures are listed below, and are incorporated by reference herein:
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Clark J. Chandler... [et al.] Washington, D. C.: Tax Management, Inc.,
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There remains, however, a need to resolve profit measures at a
detailed level without using analytical models or statistical
extrapolation. Such
a process should utilize rule driven and data base measurement
processes
which will give large scale businesses a lower cost of maintenance and
a
technologically scalable tool to measure profit at a level of
precision or
resolution not possible in prior financial performance measurement
processes.
The present invention fulfills this need and provides other related
advantages.
SUMMARY OF THE INVENTION
Prior approaches to management's desire for an accurate measure of
individual decisions (incremental or marginal) profit impact have been
solved
by automating the accounting process for implementing accounting
methods.
Cash flows are transformed into two parts, a debit part or credit
part,
according to an accounting rule. Other non-cash accounting rules are
implemented to create "accrual" debits and credits smoothing income and
expenses and adjusting for future contingencies. (see Management
Accounting Theory Book or any source of accounting theory, where the
balance sheet equation and the consolidation process, the combination
of flows and stocks of financial data, are developed.) The first large
scale use of automated computing technology is frequently found to be
the automation of the financial control or accounting processes, since
it is easy to develop software to implement accountancy rules and
there were large benefits in staff productivity easily observable. For
businesses to observe marginal profit contributions it was necessary
to use accounting information and make reasoned conclusion on how to
apportion or extrapolate this information into incremental customer,
product or organizational profit detail. (See Fig. 1)
What these methods of profit measurement lack are the adequate level
of detail to measure an individual or incremental decision's impact on
profit.

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To gain this new level of profit resolution this invention is designed
to use micro profit measurement rules applied at a granular level
consistent with standard accounting practice using a combination of
actuarial science and
mathematical set theory. The invention is designed to utilize
massively
parallel computing operations using relational database management
techniques enabling profit measurement at a level not available today
in a
large individual customer scale business. This invention does this
through a
consistent application of measures to a class of business entities
which
represent the smallest common component of profit measurement desired
the Profit Object.
The invention's method of apportionment of non-object related profit
measures specifies a method which will not change the ordinal or
cardinal
profit contribution ranking when only marginal profit measures are
counted.
This specification is what makes it possible to apply marginal
measurement
rules (see Micro-economic theory literature) with macro economic
principals;
namely the sum-of-the-parts equals the whole criterion which is the
basis of
financial accounting theory and practice.
The invention decomposes profit measurement analytical calculations
into five classifications:
1. Marginal profit measures associated with use of the
business'balance sheet resources;
2. Marginal measures of non-balance oriented revenues;
3. Marginal cost measures;
4. Marginal measures of expected costs or revenues; and,
5. Apportioned cost measures.
This classification provides for additive profit measures across the
five components. The calculation process is designed to be independent
across classes & 4 above with the addition of class five to preserve
sum-ofthe-parts integrity without simultaneous calculations typically
found in profit measurement processes. When all five profit measures
are summed at the lowest level of profit detail, a consistent set of
profit values for all types of aggregations are possible-all profit
measurement then originates from the same point in a profit database.
The simultaneous use of these five analytical frameworks makes
possible a detailed level of profit calculation consistent with
GAAP.
In particular, the present invention relates to a process for
determining object level profitability. In its basic form the process
includes the steps of:
1. Preparing information to be accessed electronically;
2. Establishing rules for processing the prepared information;
3. Calculating at least one marginal value of profit using
established rules as applied to a selected set of prepared
information;
4. Calculating a fully absorbed value of profit adjustment using
established rules as applied to the selected set of prepared
information; and,
5. Combining the at least one marginal value of profit and fully
absorbed value of profit adjustment to create a measure for object
level of

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profitability.
More specifically in the step of preparing information to be accessed
electronically, the database is prepared, object attributes are
extracted, conditioned and loaded into the database, and financial
statement attributes are extracted, conditioned and loaded into the
database. If desired the step may also include extracting,
conditioning and loading the event attributes into the database, and
calculating funds transfer treatment rates.
In the step of establishing for processing the prepared information
for rule establishment providing the information necessary to select
objects and perform the correct profit calculus is accomplished. The
step of calculating at least one marginal value of profit using
established rules as applied to a selected set of prepared information
includes calculating net interest, other revenue, direct expense,
and/or provision for the selected set of prepared information. Net
Interest (NI) is the summation of interest income, value of funds
provided and earnings on equity funds used less the sum of interest
expense and cost of funds used. Other Revenues (OR) is a measure of
profit contribution from non-interest related sources. Direct Expense
(DE) is the profit value reduction due to marginal resource
consumption by the object.
Provisioning (P) is the expected profit value adjustment for future
outcomes related to the object.
The step of fully absorbed profit adjustment, Indirect Expense (IE),
is
an apportioned profit value adjustment for all non-object related
resource
consumption by the business.
In the step of combining the five profit values, NI + OR-DE-P-IE,
may be adjusted for taxes and/or object economic value.
The foregoing elements of the invention, which have been explained at
a micro elemental level can be advantageously employed in massive
amounts
and parallel process power. For example, in the macro perspective of
the
invention the basic steps can be utilized.
The present invention gives management profit measures tailored to its
need for accurate decision oriented profit information required to
manage a
large organization based on profit measurement. This invention gives
businesses the ability to resolve profit measures at a level of detail
necessary
for all types of application of profit oriented performance
measurement.
Other features and advantages of the present invention will become
apparent from the following more detailed description, taken in
conjunction with the accompanying drawings which illustrated, by way
of example, the principes of the invention.
BRIEF DESCRIPTION OF THE DRAWINGS
The accompanying drawings illustrate the invention. In such drawings:
FIGURE 1 shows existing profit calculation process flow.
FIGURE 2 shows analytical processing relationships.
FIGURE 3 shows the invention's information flow.
FIGURE 4 shows the invention's data relationships.
FIGURE 5 shows the invention's process flow.
FIGURE 6 shows the invention's database preparation process step
detail.
FIGURE 7 shows the rule maintenance process.
FIGURE 8 shows the net interest measuring process
FIGURE 9 shows the other revenue measuring process.

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FIGURE 10 shows the direct expense measuring process.
FIGURE 11 shows the provision measuring process.
FIGURE 12 shows the indirect expense measuring process.
FIGURE 13 shows the profit component aggregation and adjustment process.
FIGURE 14 shows a partial relational database schema for an airline industry example.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in the accompanying drawings for purposes of illustration, the present invention is concerned with a detail profit metric (DPM) designed
to be a computer database application (i. e. software) for profitability
measurement. DPM's profit measurement system is fundamentally
different from the common profit measurement system used by regulators
and public accountancy-yet, it is consistent with generally accepted
accounting principals. DPM is based on object level detail of cash
flows, customer events and management allocations of profit arising
from non-customer related events. DPM provides both marginal and fully
absorbed profit measures, something traditional"general ledger"based
profit accounting systems can not accomplish due to relance on
aggregate debit and credit amounts (see Figs.
2-4.)
The following is a definition of the inputs (attributes or measurement
parameters), the method of processing and the output of the DPM
process.
Definitions
Object Attributes
These are data about the object being measured. Different businesses
have different objects of detailed profit measurement. Examples of
profit measurement objects include an airline using"seat"as the profit
object, an insurance company using a"policy"object or a bank use an
"account"object-these objects represent the lowest level of detail
required for consistent internal multi-dimensional internal profit
analyses. Types of data attributes associated with these objects
include: balances, rates (or interest accrued), product
identification,
exposures, expected loss frequency, and various dates (e. g., start,
finish, rate reset, last payment, next payment, life, etc.)
Event Attributes
These data are about events (a resource consuming activity) related to
the object being measured. Data found here include object
identification, transaction amounts, quantities, event location, event
time, counter-party identification, event type (e. g., payments,
interest
paid or earned, purchases, refunds, etc.) At least one of these
attributes must relate the event to at least one Object.
Financial Statement Attributes
These are data about the company's financial statement. Data found
here include balance sheet and profit statement amounts usually
aggregated by the legal or management entities that own a group of
objects being measured. These data will be current accounting period
either actual or planned.
Profit Measurement Parameters
These data include parameter values necessary to perform the object
or event level profit calculations. The major classifications of these
data are:
* Funds valuing rates ("Treatment Rates")-DPM's funds transfer pricing
method uses maturity opportunity rates used in valuing each object's
marginal use or source of internal funds (balance sheet resources).

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*. Unit Costs-DPM's Direct Expense calculations require unit cost
parameters. DPM can calculate unit costs, when unit cost data are not
available; in these instances, if the total cost is provided a
financial
statement attribute and then unit cost is derived by dividing total
cost
by an appropriate attribute quantity amount.
. Allocated Amounts-In both Other Revenue and Indirect Expense.
calculations this amount is apportioned amongst all objects in a
group.
Miscellaneous Calculation Values-Some of DPM's calculations require
non-system of record values. For example, number of days in profit
measurement period or equity allocation weighting. These values are
known as"modeling"parameters.
* Amortization Parameters-Interest amortization requires an interest
rate and expected life attributes. Straight line and declining balance
methods of amortization require expected life values.
Expected Profit Adjustment Measurement Parameters-Provision
calculations require appropriate attributes, such as: expected loss
rates, reserve percentages, exposure factors, recovery rates, default
probabilities and collection costs.
Tax Rates-Tax rates are required for after-tax profit calculation. DPM
is designed to calculate pre-tax income on a taxable equivalent basis
(where an single effective tax rate is all that is required to
transform
pre-tax income into after tax earnings.)
Profit Measurement Rule Specification
DPM's processing approach is to combine profit measurement
techniques with (non-modeled) data and calculation parameters. Each
application of this calculus is called a rule. DPM is designed to
allow
the user the freedom to associate a group of objects with a rule and
to
use object-level information in combination with rule parameters to
calculate profit values. The DPM invention uses profit measurement
rules separate from, but applied to, object data and the use of
relational
database concepts, giving the user a flexibility in both the
assignment
and depth of definition of measurement rules and measurement
resolution. Use of this method is especially suited for massively
parallel computing technology where linear scaleable capital
investment in processing technology is possible vis-a-vis object and
event count and rule complexity.
The types of calculation (Rule types) are:
Funds Treatment-Every object with cash flows affecting a financial
statement's balance sheet requires a method of valuing an object's use
or
source of funds. The common name for this approach to valuing is know
as"Matched Maturity Funds Transfer Pricing."DPM uses a canonical
representation an object's funding characteristics for computational
performance. DPM's methodology requires effective yield adjustment to
eliminate the allocation of interest payable/receivable required by
GAAP.
A value, based on effective yield adjusted market price (the yield
curve),
is then determined by DPM for each instance that requires an interest
rate
transfer prices to calculate an object's marginal Net Interest (NI).
Equity Allocation-In order for precise net interest revenue or

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economic
value adjusting calculations the amount of equity funds required at an
object level must be determined. DPM's equity allocation to the object
level calculations may use any of the following methods: simple
ratios;
regulatory definitions; economic allocations based on econometric
modeling (see book on Modern Portfolio Theory) methodologies; or, as
statically defined allocations.
Balance Sheet Allocations-Complete calculation of Net Interest may
require an object level allocation of some financial statement balance
sheet amounts.
Apportionment-In both Other Revenue, Provision and Indirect Expense
calculations are applied at the object level using Financial Statement
Attributes which are not related directly to an object. These profit
adjustments are made so that the sum of all object profit equals the
whole
enterprise's profit-an important property of DPM's output. Accountants
refer to this profit measurement technique as"full allocation of
profit."
DPM's approach is to pool indirect costs and revenues and then
apportion
them. Apportionment rules specify how the pool is completely allocated
to
appropriate objects. DPM uses a specific closed form (mathematical
formula that require only information known in the current period and
no
iterative computation) allocation rules.
Amortization—Some types of income or expense are deferred or accrued
over multiple periods including and subsequent to the current
accounting
period. This is common to accrual accounting methods used in financial
statement profit presentation and give rise to timing differences
between
cash flows and their related profit as presented in a financial
statement in
any accounting period. Since DPM is designed to mirror a financial
statement's profit measure it must support deferral and accrual
accounting
principals. Amortization methods are included in DPM to reflect these
GAAP concepts. DPM's amortization methods include: interest method of
amortization (used for interest income and expense accruals and for
deferral of fees that are in lieu of interest); and, straight line or
declining
balance amortization methods (used for cost or income deferrals and
capitalized investment depreciation.) 'Other Revenue Pricing-In
situations where object and event activity can
be used to derive object level income or fees DPM provides for the
calculation of these drivers of profitability in Other Revenue profit
calculations. These calculations take the mathematical form of a
linear
combination of event or object values and modeled coefficients.
Direct Expense-Calculation of object profit adjustment due to object
related activity requires rules that take the form of linear
combinations of
event or object values and modeled coefficients.
'indirect Expense-in situations where expense apportionment or
amortization amounts are aggregated the user may want different rules
applied depending on the path (or dimension) of aggregation. These
rules
allow for multiple profit calculations rules to be applied to derive

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multiple
object level indirect expense amounts.
Provision-Adjusting current profit for expected future value changes
is
known as"actuarial"profit provisioning. The technique is well known by
the
financial industry's accounting practice. DPM applies actuarial based
methods in its object level profit calculations where the Provision
pre
adjusts profit for contingent or known exposures to future profit.
Taxable Equivalent Gross-up-Profit is usually an after-tax measure.
Some events or portions of some object profit may be excluded from
normal taxation. DPM's approach is to adjust these pre-tax values so
that
a singular tax rate can be used to convert pre-tax profit into
after-tax
values, known as taxable equivalent adjustment. For the purpose of the
remaining detailed description all profit and loss profit measures are
tax
equivalent amounts (e. g., TEG * Amount.) These rules use object and
event attributes to drive an adjustment for each of the five classes
of profit
amounts to a taxable equivalent basis.
Interest Yield Adjustments-Since DPM can derive profit for any length
of
accounting period from daily to annual, the adjustment of cash
interest
payments and the financial statement's accrual or smoothed
representation of interest related Profit, DPM requires a method for
converting cash interest amounts to financial statement accrual
amounts.
DPM implements the mathematical concept of"effective interest rate"
conversion to accomplis this type of calculation.
Before the calculation rules can be applied at the object or event
level a calculat incrementally migrate objects to increased
measurement precision as justified.
This valable piecewise increase in functionality is possible due to
DPM's combination of rules and data in a mathematical set theoretic
framework. This approach allows for a relational database management
system implementation. It is nearly impossible develop and maintain
procedural based software with as much flexibility and with the
capability to simultaneously support the number of calculation
permutations required by
DPM.
Restatement Functionalit
Since DPM is a rule based system the ability to restate prior period's
Profit calculations are systematically possible providing historical
data exists.
DPM's design of object level profit measurement enables a unique
historical profit restatement capability. Three features of DPM's
restatement capability are:
1. Produces a mathematically consistent time series (i. e. no
measurement
bias) of object level Profit. DPM restatement functionality is
designed to
apply the same Rules to all available historical object or event level
data.
2. DPM's restatement functionality preserves accrual objecting
integrity when
the object history is restated for different length accounting

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periods.
Implementations of daily, weekly, monthly, quarterly, semi-annual, or
annual profit calculations and mixing different periodicity in
historical data
without loss of analytical integrity.
3. Capable of object's profit history restatement. If a DPM user
changes
Rules or Rule Maps and/or changes the way a subset of object's Profit
are
calculated and if the historical data is available per the new set of
Rules then
the user can restate historical profit measures for these subset of
objects.
Processing (see Fig. 5)
1. Populate Database (see Fig. 6)
Perform standard database administration actions to initialize data
for the required calculations:
1. Perform database Initialization
2. Extract, condition & load object attributes
3. Extract, condition & load event attributes
4. Extract, condition & load financial statement attributes
5. Calculate and populate NI treatment rate attributes
2. MAINTAIN OBJECT GROUPS AND RULE MAPS (SEE FIG. 7)
Populate or edit Rule parameters necessary to perform calculations.
Rules definition is by association of specific, non-iterative
calculation, as described below, with a set of object or event
attributes defined as a data filter (see Relational Data Base
Management System textbook). Rules have two pieces:
1. Parameters to drive the object selection or data filter for
calculations; and, 2. Parameters specific to the appropriate
calculation methodology.
An easy-to-use graphical user interface can be used to maintain these
data.
Steps 3 through 6 perform object and event level profit calculations.
Steps 3,4,5, and 6 can be processed independently, step 7 requires
values
derived in step 3,4,5, and 6 and therefore occurs sequentially.
3. Calculate Net Interest for All Objects (see Fig. 8)
Net Interest is:
Ni = Interest Income-Cost of Funds + Value of Funds-Interest Expense +
Earning on Allocated Equity
Correct interest rates for calculation of interest income or expense
depend on the length of the profit measurement period. Using actuarial
mathematical techniques the bookkeeping required by GAAP for interest
receivables and Payables can be avoided in NI calculus. A known
technique (see M Stigum, Money Markets) to accomplis this adjustment
for profit measurement according to GAAP (i. e. accruals) the
following calculation is used to convert interest rates:
Let $r_{neW}$= annualized rate with new compounding factor
r = annualized ratewithold compounding factor
m = number of old compounding periods per year
n = number of new compounding periods per year
Then
NI CALCULATION RULE TYPE I
The object balance is either an asset or a liability amount for Type I
calculation.
Let AAB (o = Average Asset Balance of the object ou
ALB (oj) = Average Liability Balance of the object oi
rate asset (o ) Effective interest rate for object oi as an asset
balance

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rate liabilityUi) = Effective interest rate for object oi as a
liability balance
Rt = Treatment rate based on the identified treatment for the object's
product attributes
Int Inc (oj) = Interest Income of object ou
COF (o = Cost of funds used by object ou
Int Exp (o = Interest Expense for object ou
VOF (oi) = Value of funds provided by object ou
Then,
(oi)=AAB(oi)*rateasset(oi)IntInc
{Compute only if object attribute doesn't existj
COF (oi) (oi)*RtAAB
(oi)=ALB(oi)*rateliability(oi)IntExp
{Compute only if object attribute doesn't exist}
VOF ALB(oi)*Rt=
NI CALCULATION RULE TYPE II
Let AB(c,tO(oi) = Average Balances of the object oi
rate (e. t) ( o,) = Effective interest rate for the corresponding
balance asset or liability
Rt (o) = Object o's product type/group as needed to identify treatment
rate
R (et) (pt (o)) = Rate (treatment rate) for objects of this product
type/group, given the balance class, and tier
Int Inc(oi) = Interest Income of object ou
COF (o = Cost of funds used by object ou
Int Exp (o = Interest Expense for object ou
VOF (oi) = Value of funds provided by object oi
Then, where summations are over the possible balance variables
(class, tier) for the object,
AB (, (Oj)*rate.t)(o.)
{calculate only if object attribute doesn't exist}
y
COF (oj) = E t AB (assetec. t) ( i) R (assetc"t) R (cat) (pt (o))
Vc, t
y
P (i) tC t AB (IiabilitYc"t) ( j) * rate (liabilitYct) ( j)
Oc, t
{calculate only if object attribute doesn't exist
y
VOF (o.) = ,.,) (o. rRtyc. t) R (c..) (pt (o))
Vc, t
Allocated Balances
Let Total Amount = Balance Sheet amount to be allocated to object
RuleforallocatingAmountRule=
Then, DPM calculates the allocation to object o to determine the
allocated balance:
B (o Rule applied to (Total Amount)
The Allocated Balance
Treat this balance as any one of the average balances associated with
the object, where class is specified by users, tier is"allocated".
Thus, Bi(oi) is one of the AB(c,t)(oi) defined above.
Nl CALCULATION RULE TYPE III
Let AB (c. t) (o.) = Average Balances of the object oi
rate (c. t) (o,) = Effective interest rate for the corresponding
balance
Type p,a(oi) = Object oi's product and object attributes as
needed to identify treatment
R(c,t)(typep, a (o i)) = Rate (treatment rate) for this object's
product
type, given the balance class, and tier/tenor

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Int Inc (o = Interest Income of object ou
COF (o = Cost of funds used by object o,
Int Exp (o = Interest Expense for object ou
VOF (oj) = Value of funds provided by object oi
Then, where summations are over the possible balance attributes
(state, tier) for the object,
y
Int Inc (oj) = E AB (assetc, t) ( i) * rate (assetc, t) ( i)
Vc,t
(calculate only if object affribute doesn't exist)
AB (asset c, t) (o i) * R (asset c, cytYPe p. a (o i))
ho, t
Vc,
y
Int Exp (oj) = V t AB (liabilityct) ( i) rate (ljabj^y; ( i)
Vu, t
(calculate only if object affribute doesn't exist}
VOF (o.) = AB,,) (o. rR (type (o.)) .
NI CALCULATION RULE TYPE IV
Let AB(c,t)(oi) = Average Balances of the object
rate(c,t)(oi) = Effective interest rate for the corresponding balance
amounts
type p, a, b (o i) = Object oi's product, object attribute, and
behavior types as needed to identify treatment
rate
R (c. (typep,a,b(oi)) = Rate (treatment rate) for objects of this
product
type, balance class, and tier/tenor
Int Inc(oi) = Interest Income of object ou
COF (o = Cost of funds used by object ou
Int Exp (o = Interest Expense for object ou
VOF (o ;) = Value of funds provided by object ou
Then, where summations are over the possible balance variables (state,
tier) for the object,
tnt tnc (o.) = AB (,,. t) (o.) * ratet,.,) (o,)
(calculate only if object attribute doesn't existez
COF(asset c, t)* R (asset, t)tYPep, a, b ;
) ntExp (o ;) = AB,. ty.,) (o,) *ratejty.,) (Oj) ;
(calculate only if object attribute doesn't existj
VOF (oj) = E AB,) (o. rR. ty..) (typep. a. b (o.))
NI CALCULATION RULE TYPE V
Any Net interest calculation that is non-iterative, canonical, and
represents the marginal GAAP valuation of an object's balance sheet
resource related revenues or expenses for each (ou).
Note that in firms that are highly leveraged, the use of COF/VOF
separation leads to a significant and volatile piece of NI, the net
difference between to sum of COF and the sum of VOF (after adjusting
for EOAE per the following section) and the firm's total NI. This is
known by a banker as "mismatch profits arising from the difference in
tenors" (duration) of the assets and liabilities. If VOF and COF rates
are based on matched maturity of objects then the difference between
the firms total NI and the sum of the objects is the profit arising
from the firm having different duration of balance sheet related
objects. Since this profit is not related to a specific object, but
the combination of objects in the enterprise, a separate profit
measure is appropriate and possible using DPM's approach. The use of
the rules above allow for a novel method of calculating funds transfer
pricing, since the rules are based on sets, the processing can be
preformed in parallel. Further, since the rules are canonical this
approach leads to a computationally efficient method of calculating

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these types of profit values.
Ni CALCULATIONS OF EOAE
Since GAAP financial statement's balance sheet is based on the
balancing equation Assets equals Liabilities plus Equity, NI should be
adjusted for the value of the Equity resource consumed by each Asset
or Liability object. Calculating Earnings on Allocated Equity as part
of an object's NI:
Four exclusive options are provided for allocating equity to objects.
DPM's options are as follows:
Option 1 No calculation of EOAE.
Option 2 EOAE calculation based on a simple equity ratio.
# Option 3 Equity allocation for all assets following regulatory
standards.
Option 4 Equity allocation using an economic allocation rule, based on
object cohorts and modern portfolio theory's capital asset pricing
model.
Option 1
EOAE(oi)=0
Option
Let Let AB (asset. t) (o,) = Average Asset balances of the object o*,
including any allocated asset balances
ER = Equity Ratio
R equity = Treatment Rate for equity
Then, EOAE (oj) = R equity * ER * E AB (asset. t) (os)
where the summation is taken over all asset balances.
Option 3
Let Amount (o = Amount (s) associated with object'a'This may be the
average asset balances of the object o ;' including any allocated
asset balances, or may be an object parameter, etc.
Wt (type ( = Code needed to identify the weight for object o
balances, at the object-type level
W (Wt (type ( = determined by the weight code
Cap Ratio = An appropriate risk-weighted capital ratio chosen
R equity = Treatment Rate for equity
Then, EOAE (oui)
[Amount (oi) * W (Wt (oui)) * Cap
Ratio]
where the summation is taken over all balances of oi if there are
multiple amounts.
Option 4
Let Amount (o = An amount or amounts related to the object, such as
average balances of the object (denoted AB(c,s,t)(oi)
Cohort (oj) = The cohort of objects in which object o is a member
Ecohort (oi) = The equity allocation rule for the cohort of object o.
This is a linear (two-valued) function that operates on Amount (oj) of
the form a + *Amount (o).
Requity = Treatment Rate (s) for equity for the Amount (oj) value (s)
Then, EOAE(oi)
= Requ. ty*E (o) (Amount (Oj))
= E Requ [a+Amount (o.)]
where summation occurs if Amount(oi) is a set of values (such as the
object and allocated balances related to the object).
4. Calculate Other Revenue for All Objects (see Fig. 9)
OR Calculation Rule Type/
Let OR, = Financial Statement Other Revenue attribute subset,
ORj (oj) = The amount of OR, apportioned to object oj,
O (OR = the objects that map to ORi.
Let M be an OR calculation method, where M is dependent upon the
OR subset under consideration. We then have the following.
If M (OR = a"balance"attribute method.

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Define
M (ORi) (oi) = An average balance method for calculating oj's OR
,,. . Balance (oi) .
and ORi (oi) = ORi-Balance (oi)
Balance (Oj))
i
where the summation is over all oi in oi(ORi).
If A"count"methodforcalculatingoi'sOR=
Define
1M(ORi)(oi)= and ORi*1=
(count(aj) in O(ORi))
where the count is over all oi in oi(ORi).
If M (OR ="event count,"we can define
M (ORi)(oi) = Count of events in profit measurement period for object
oi
count of events for object o
and ORj (oj) = ORj *
tcount of events for object (ou))
i
where the summation is over ale oui in oj (ORj).
If M (OR ="event amount"
DefineM (ORj) (oj) = (event amounts foroi)
events over the period
(event amounts for object oi)
. .-)/\ < -\r- < * eventsoverthepenod
and ORj (oj) = ORj * eVentsOVertheperiod
E amounts for object oi)
j events over the period
where the summation is over all events in oi(ORi), and the events are
restricted to a class of event type. Then, we have the total OR for
object o given by the sum of these allocations for all sets for which
a has an association:
OR (os) = summing over i.
As a generalization, these formulas can be written in shorthand where
M (OR) is the corresponding function of'o'above, as:
M (OR.) (oi)
ORj (oi) = ORj ajeA (ORj)
1 : M (ORi) (oi,)
i
and
-oi eQORi) M (ORi) (oi)
OR.(o ;)- [ORi * a EA (OR ;)'1
i M (OR ;) (or)
i
OR Calculation Rule Type//
The formula for OR calculation is given as follows :
Let o = Object being considered
ORi(oi) = OR apportioned to a (if any) from a set OR,
Event (t)i(oi) = The event reflecting the activity of object oi in the
period restricted to a given event type t.
Amount (Event(oi)) = An event amount
Rev (Evti(oi)) = The revenue amount associated with this event.
This is
assumed to be of the form
=L *CoM ( (), (o)) + */M), (o))]
typeti
where a, are pre-entered values.
OR (o = Total OR apportioned to object ou
Then O R (o*) = EE (Rev (Event (t) i (a)) summed overall the events of
. yp. t,

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oi
+ apportioned revenue as in the Type I case.
=*CoM (eM, (a)) + *yM), (a)) j +
IYNI i
E (ORj (os))
OR Calculation Rule Type III
Let o = Object being considered
ORi(oi) = OR apportioned to the object (if any) from a set OR
Event (t), ( o,) = The events reflecting the activity of object o in
the period
restricted to a given event type t
Amount (Eventi(oi)) = The event amount
Rev (Eventi(oi)) = The revenue amount associated with this event.
This is assumed to be of the form
= E [xj *Count (Event (t) (o)) + j *Amt (Event (t) (o))] where a, p
typeti
are pre-entered values based on event type. For completeness, a = p =
0 in the event amount is null.
AM = The method of amortization = cash, SL, DB, interest AMk {amount}
= Deferral on amount, using method AM, at time k (= 0 if k > life);
and life = 1 if cash basis is selected
AMnow {amount} = Deferra ! on amount, using method M, at this period
now; note
that this is at various points of life for various amounts
Let OR (o = Total OR apportioned to object oj.
Then OR (o = Amortized amounts in their first amortization period
+ amortized amounts in their higher amortization periods
+ amounts not amortized but apportioned from a pool as in Type I
We take this step at a time. First, consider the amounts in their
first amortization period. These are calculated as follows, using the
formula generated in Type li:
Then OR (oui)
= (Rev (Event (t) i (oi)) summed over all the
transactions of
+ apportioned revenue as in the Type I case.
= 1 : E [xi * Count (Event (t), (oi)) +, 6i * Amt (Event (t) i (oi))]
typeti
where the AM, methods vary with the event types. We can group the
amounts being amortized by their amortization characteristics. For
this purpose, let
Pool, (L, M) = the pools of amounts amortizing in this period for the
first time according to life L and amortization method M. The new
amortizing amounts can be rewritten as follows:
New amortized amounts
= Pool, (L, M)
L, M
Similarly, define
oolk (L, M) = the pools of amounts amortizing in this period
for the kth time according to life L and amortization method M, where
L #
k. N. B. any amortization calculation can be used if the calculation
can
be derived using known Object Attributes.
Then, the total OR for object oi in this period is computed as
follows:
OR(oj) = LL [xj *Count (Event (t) i (oi)) + j *Amt (Event (t) (oi))]
typeti
+ E E Poolk (L, M)
k > 1 L, M
+ E (ORs (oi))

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= g S Poolk (L, M) + E (ORs (o*))
k L, M i
OR Calculation Rule Type/
Foregone OR:
Let Actual OR for object oi = ORactual(oi) - CASH AMOUNTS
Let Expected OR for object oi = ORexpeded (oi)
Then, Foregone OR for object oi = ORforegone(oi) = ORexpected(oi)
CASHAMOUNTSORactual(oi) -
OR Calculation Rule Type V
Any Other Revenue calculation that is non-iterative, canonical, and
represents the entire GGAP valuation of non-balance sheet resource
related revenues or expenses.
5. Calculate Direct Expense for All Objects (see. Fig. 10)
DE Calculation Rule Type/
None directly specified-use IE calculation rules (any type). For each
IE rule used in this way, substitute DE (oj) for IE (oj) in any IE
calculations used as DE.
DE Calculation Rule Type 11
Direct expense will be a variable dependent upon the object and the
event being costed. These determine the unit cost to be used and the
calculation type, along with the multiplier rule being used if
external amounts are needed. Thus, using subscripts to indicate
variables used,
DEobject, event-type
unit costeventtype * (no. of events of this type in the period)
+ amounts taken from an event file
+ costs calculated as a
percentage of Event Amount Where the unit costs, and revenue
percentage by event type, are all entered by the user as
pre-processing
inputs.
Then, DEobjec,-E DEobject, event-type
event types
where the summation is over event types.
DE Calculation Rule Type 111
DEobject, event-type, event-sub
= unit costevent type* (no. of events of this type in the period)
+ amounts taken from an event file
+ costs calculated as a percentage of event amount
DE Calculation Rule Type IV
Two calculations are made, each one using the above calculations,
processing two independent DE attributes for each object. DE is
calculated twice for each object, allowing for comparison of plan to
actual values or standard to actual values or any scenario to scenario
comparison.
DE Calculation Rule Type V
Any Direct Expense calculation that is non-iterative, canonical, and
represents the entire GGAP valuation of costs related to object or
sub-object level details.
6. Calculate Provision for All Objects (see Fig. 11)
P Calculation Rule Type I
The formula for calculating P of Object i is as follows, where PG (oi)
denotes the P group in which oi is a member:
P of o i
PE RPG (oi)
EBalance k
k
P Calculation Rule type II
The formula for calculating P of o ; is as follows, using the same
symbols as above and RF (oi) denotes the expected adjustment factor

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for oi:
Balance (os) * RF (os)
P(oj) = PG (oj) k fpG (oj)
[Balance (oj * RF (oJ]
k
P Calculation Rule Type III
The formula for calculating P of object "oj" is as follows, where Pr (oj) is a probability for object oi.
1 P(oi) = Exposure (oi) * Pr(oi) * Expected Value Adjustment (oi)*
Li
Where L is the expected number of reporting periods during the life of o.
P Calculation Rule Type IV
The addition of any of the Type 1, 11 or III P rules applicable to an object i.
P(oi)PtypeI+P(oi)PTypeII+P(oi)PTypeIII+P(oi)PTypeIVP(oi)=
P Calculation Rule Type V
Any Provision calculation that is non-iterative, canonical, and represents the entire GGAP valuation of expected costs related to future events, contingencies, timing effects.
7. Calculate Indirect Expense for All Objects (see Fig. 12)
Indirect expense, by its nature is not related directly to an Object, therefore apportionment techniques are used to allocate indirect expense to an Object. Any apportionment function is allowed as long as it is derivable at the object level using ratios of attributes available at the object level to the summation of this available attribute across all objects receiving the apportioned expense.
Examples of this type of ratio calculation (the function "F" used in the IE calculation types) are:
Ratio 1: Balance-based apportionment of IE.
Define Apportionment ratio using Current Balance of (o ;).
Thus, the allocation of Indirect Expense k becomes (function F (1Ek) (oj) in
IE rules below):
Current Balance of o,
E (Current Balance of o j)
i
summed over all objects in grouping j.
Ratio 2: Count-based apportionment of IE
Thus, the allocation of Indirect Expense k becomes (function F (1Ek) (oj) in
IE rules below):
1 IEk * , for all objects in grouping j.
(count of oj in O(IEk)) 'Ratio 3: Revenue-based apportionment of IE
Define NI (oj) + OR (oi) = Total Revenue (using NI & OR rules above) for (ou).
Thus, the allocation of Indirect Expense k becomes (function F (1Ek) (oj) in
IE rules below):
summed over all objects in grouping j * Ratio 4: Event Count apportionment of IE
Count of events for (oj) are restricted to an event type.
Thus, the allocation of Indirect Expense k becomes (function F (1Ek) (oj) in
IE rules below):
1Ek * count of event for object oi
F7\
E (count of event for object (o j))
for some event type, summed over all objects in grouping j.
# Ratio 5: Transaction Amount apportionment of IE

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Summation of event amounts for (ou), restricted to a event type.
Thus, the allocation of Indirect Expense k becomes (function F (1Ek)
(01) in
IE rules below):
(event amounts for object (o,))
IEk * eventovertileperiodi
(event amounts for object (oj))
j event over the period
for some event type, summed over all objects in grouping j.
Ratio 6: Direct Expense apportionment of IE
Using DE rules above for 0,
Thus, the allocation of Indirect Expense k becomes (function F (1Ek)
(oj) in
IE rules below):
summed over all objects in grouping j.
'Ratio 7: Normalized (averaged) apportionment of IE
Thus, the allocation of Indirect Expense k becomes in IE rules below:
F (tEJ (o,) = () E using Ratio 1 F (1Ek) (oj) + IE using Ratio 3 F
(1Ek) (oj)
+ IE using Ratio 6 F (IEk) (oi)]#3.
IE Calculation Rule Type/
Indirect expense is apportioned to accounts using one of the first
three apportionment ratios above. Accordingly, using the nomenclatures
above, IE (o,) = (Total IE to be apportioned)
IE Calculation Rule Type in
The rules for partitioning IE and defining corresponding object groups
are based on product and event attributes. The calculation of IE (o,)
is exactly as described above, and is given by the following, where
the F's are the given apportionment ratios (any of the seven
apportionment ratios are permitted for any partition O or groupings of
objects).
IE Calculation Rule Type///
For Indirect Expense before deferral calculations, the process is
similar to that as listed for the Type II Level, where: IE (oi New
amounts in their first period of amortization
+ Amounts not being amortized (cash basis)
+ Amounts in their 2nd through last amortization period.
Since we include non-amortized amounts (cash basis) to be considered
as amortized with only one period, this is re-written as follows:
IE (oj) = New amounts in their first period of amortization (including
cash-basis)
+ Amounts in their 2nd through last amortization period.
Note that non-amortized amounts are made to fit this equation by
considering them to be an amortization of one profit reporting period
only.
Each I E set can have a different amortization type or period, though
all objects receiving a specific apportionment will share the same
amortization Rule.
The new amounts to be deferred are computed, therefore, as the
following: Before deferral
added over each set IEk to which oi is related.
Each of these terms may be deferred over its amortization period
according to any of the amortization rules (cash, straight line,
declining balance, or interest amortization calculations). Since
amortization methods may vary by set, we have the following, where AM,
(L, R) is used to denote the amortization rule and its life:
To this is added the amounts with remaining amortization life for
which amortization was begun in earlier periods.
IE Calculation Rule Type in
Multiple combinations of the any of the above IE type rules I, II, or

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III are calculated per object.

IE Calculation Rule Type V

Any Indirect Expense apportionment calculation that is non-iterative, canonical, and represents the GAAP evaluation of indirect costs.

8. Calculate After-Tax Object Profit for All Objects (see Fig. 13)

$Profit(oj) = [NlR(oj) + OR(oi) - DE(oi) - IE(oi) - P(oi)] * (1-EffectiveTaxRate)$ where, for a two tier taxation system, Effective Tax Rate is calculated as:

Effective Tax Rate = (1-tax rate 2) * (tax rate 1) + tax rate 2.

In the calculation of Effective Tax Rate, this formula assumes the two rates are effective rates which apply to the business conditions (not the
nominal statutory rates), and that tax rate can be deducted from income in the
calculation of tax rate Then,

Total Profit

$[Profit(oj)]$

For those companies which use economic profit value calculations, the formula changes to:

$\{[NIR(oi+OR(oi)-DE(oi)-IE(oi)-P(oi)]*(1-Profit(oi)=EffectiveTaxRate)\}-SVA(oui)$ where

$SVA(oj) = a(oi) + ss(oi) *Amount(os)$ and

$a(oj)$, $ss(oj)$ are functions for a cohort of objects in which oi is a member,

and $Amount(oui)$ is given by a rule which maps oi to a data value (such as
balance, or allocated equity) also defined at the cohort level. (A cohort
defined here represents a grouping of objects with similar risk characteristics, consistent with Modern Portfolio Theory and the Capital
Asset Pricing Model.)

. Shareholder Value Add (SVA) is a method financial analysts use to adjust profit measures for risk. The idea is to subtract from the profit measure the cost of the equity required to support whatever is being measured.

Companies use this risk adjustment measure essentially to burden the profit for risk being taken with the equity funds used by the object. These institutions will classify cohorts of risk and the risk cost equivalent as a percentage of account balance or allocated equity (i. e.,"Hurdles"):

DPM Example

In the airline industry a need for detailed customer profitability can be measured using DPM. Here the fundamental object is the seat, allowing consistent profitability values aggregated by route, aircraft type, as well as customer dimensions using data warehousing technology. The need for detailed customer profitability is being driven by the business impact analysis required to support loyalty and alliance strategic decisions. The following is a DPM profit calculation for a seat, with real profit measurement parameters simplifie (not all aspects of true airline business is demonstrated) and where
examples of each type of rule are utilized in DPM processing.

Flight:Air101

Date: 7/1/1998

From: London

To: New York

Equipment: Boeing 747-400

Classes: First (20 Seats); Business (80 Seats); Economy (300 seats)

DETAILED PROFIT METRIC PROCESSING

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Step 1: Populate Database-assuming a relational database management
system and terminology.
Initialize database;
Extract, Condition, and Load the following tables: Planes,
Flights, Customers, Employees, Locations; The net balances in the
Planes entity can be maintained by use of DPM amortization IE
calculation from the prior period.
Extract, Condition, and Load the following tables: Financial
Transactions,
Events; Manifest (occupant, seat, flight, date attributes);
Extract, Condition, and Load the Financial Statement table; *
Calculate and populate Rate table;
Figure 14 shows a partial relational database schema showing the
entities
and attributes used in the example's processing.
Step 2: Maintain Object Groups and Rule Maps-a database processing
routine is run creating the following groupings:
Class to Seat
Flight to Locations
Seat to Plane
For ease in understanding the rule the specifications used to populate
the database with rule parameters the processing instructions are
shown
below in the Rules. Also, most rules group by plane-the rule
discussion
below assumes this grouping without reference.
Step 3: Calculate Net Interest for Seat-Four types of NIR rules are
processed-type 1, 11, 111, IV for each seat. Interest rates are
matched to plane
purchase date for initial plane investments, and interest rates for
plane net
capitalizable improvements are funded with a 5 year pool of rates.
Plane asset
balances are keep in the Plane table maintained in Step 1.2 above.
NIR Type/ : Carry cost of plane asset by seat is determined.
Rule
Populated in Step 2 are:
The AAB (seat) parameter is Plane: net~orig~bal * (1/total
seats on plane)
The rt parameter is Treatmentrts: 25rate (maintained
for each plane) There is no need for liability rates.
Calculate COF (seat) = AAB (seat) * rt for all seats on flight.
All other attributes are NI Type I calculations results are null. No
grouping.
NIR Type//: Allocate net receivable/payable to seat for carry cost
profit
adjustment. This adjusts profitability for the impact of cash flows
vs.
accounting flows. This airline wants to apportion this cost across all
revenue seats based on c ! asswt, a modelling parameter. Total
weighted seats (tws) for the accounting period is a modelling
parameter. Where the seat factor is determined as a ratio of seat
footprint to class portion of the plane's seat revenue space. (e. g. 1
s'
= 15%, 2nd = 25% & 3rd = 60% of plane's seat revenue space with each
seat evenly apportioned in class-1/20,1/80,1/300 respectively, in this
case.)
Rule
Populated in Step 2 are:
# The AB (seat) parameter is Financial: net recv'ble * (1/tws

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)
* The rt parameter is Treatmentrts: pool (for null plane row)
There is no need for liability rates.
Calculate COF (seat) = AB (seat) * rt * clashs.ut
Grouped by class all seats, so no seats??? is no~seats1st
value in the plane entity for first class seats on this plane, and
so on for 2"d & 3ro class seat groups. The net recv'ble column is
derived from the difference between sum of periodamts for the
receivables minus sum of payable rows for this profit period.
All other attributes and NI Type II calculations results are null.
NIR Type III: Calculate the NI value of the customer mileage benefit
payable for each seat.
Rule
Populated in Step 2 are:
The AB (seat) parameter is Customer: benne-miles * loyalty
factor
The rt parameter is Treatmentrts: pool (for null plane row)
There is no need for an asset rate.
Calculate COF (seat) = AB (seat) * rt
Since a customer can only occupy one seat, no groupings are
used in this rule map.
All other attributes and NI Type III calculations results are null.
NIR Type IV: Calculate the NI impact of the plane's improvements for
each seat. Upper classes interior, customer electronics and seating
are improved faster during the life of the plane. Management strategy
is for these improvements to be loyalty program related; they are
amortized quicker and hence shorter funding requirement with less
certain life. Management wants the loyal customers to pay
proportionately more of the funding costs of improvement assets.
Rule
Populated in Step 2 are:
The AB (seat) parameter is Plane: imp~net~bal * (1/tsw) The rt
parameter is Treatmentrts: pool (for plane row) *
Customer: loyalty~rtng
There is no need for a liability rate.
Calculate COF (seat) = AB (seat) * rt * clashs-fac
The unique class-fac values sum to 1. The rule map is grouped by
classes (or class~fac).
All other attributes and NI Type IV calculations results are null.
NI EOAE-Option 4: Allocate equity based on mileage benefit and have
it reduce NI by the weighted average cost of capital for the airline.
Rule
Populated in Step2 are:
The Amount (seat) parameter is Customer: bene~miles
The equity rate is 9.75%
Calculate EOAE (seat) = Amount (seat) * equity rate * cohortwt
The cohort is based groups of each instance of loyalty~rtng and class
of seat paired. Cohortwt is"beta"and no"alpha."
All other attributes and EOAE calculations results are null.
Step 4: Calculate Other Revenues for each Seat-Revenue arises from
ticket fares, duty free sales on board aircraft, excess baggage
penalties collecte, alliance code sharing license and multiple leg
customer trips.
OR Type 1: Apportion revenue from code sharing with alliance.
Apportion revenue by seat allocated to alliance passenger.
Rule
Populated in Step 2 are:
flight: periodamt is alliance revenue per flight plus the sum
of all flight/date alliance financial transactions.
* Calculate OR (seat) = sum of Flight: periodamt *

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(1/no alliance seats available on flight)
Only for seats occupied by an alliance customer or a seat
that is empty.
OR Type// : Use Transaction table to find direct passenger revenue by
seat.
Rule
Populated in Step 2 are:
Transaction: * (amounts, seats, flight, date, transaction type)
are populated for events, financial or non-financial.
Calculate OR (seat) = sum of Transaction: trnamt
where type ="passengerpayment"for each seat.
No seat grouping in rule map.
OR Type/// : Apportion flight freight revenue amongst all seats,
weighted by dasswt.
Rule
Calculate OR (seat) = sum of Transaction: trnamt *.clashs-wu
(1/ (no seats???))
where type"freight"for each seat.
Group seats by class ( ??? Is 1St2nd3rd) Class wt is a
normalized weight for apportioning revenue amongst classes.
OR Type IV: Calculate the loyalty mileage benefit by seat.
Rule
Calculate Forgone OR (seat) = Flight:??? fare-sum of
Transactions: trnamt where type ="passengerpayment"for each seat.
Group by class for loyalty passenger occupied seats only.
Step 5: Calculate Direct Expenses for each Seat
Compute the direct cost of using the seat. This is true for both
occupied and
unoccupied seats. Fuel and flight deck crew are costs of all seats,
while cost of duty free goods sold and meals are a function of
occupied seats. Some
costs are a function of the plane taking off, no matter the duration
of the flight
(e. g., maintenance.) Some costs are a function of class, such as
cabin crew
expense and customer consumables.
DE Type 1 : Show direct cost of non-food materials
consumed in flight.
Rule
Populated in Step 2 are:
Transactions: * is populated based on these direct costs.
Calculate DE (seat) = Transactions: trnamt for all flight and date
rows where type = directexp for each seat.
No grouping in rule map.
DE Type// : Show direct cost duty free goods sold
by seat.
Rule
Populated in Step 2 are:
Transactions: * are populated based on these direct costs.
Calculate DE (seat) = Transactions: tmamt for all flight and date
rows where type = duty~free for each seat.
No grouping in rule map.
DE Type///: Show direct cost of food and beverage
consumed.
Rule
Populated in Step 2 are:
Transactions: * are populated based on these direct costs
Loading is calculated as the ratio of occupied to total class
seats by class (cl~load) using manifest table and plane
configuration values.


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Calculate DE (seat) = Flight: catering~cost * class~wt * cl~load
for each seat.
Grouped by class in rule map.
DE Type IV : The staffing of each cabin has a maximum count
with a minimum of 1 per 50 passengers. The air deck crew must fly the
plane even if there are no passengers. Calculate DE twice, once for
based on a labor cost per seat based on total crew cost and total
seats; and calculate DE a second time with actual staff apportioned to
actual passengers.
Rule.
Populated in Step 2 are:
Total crew cost (tcc1) parameter is derived using the
employee entity for all crew on flight. Tec =
Employee: salary+bene * (Flight: schdhours + 1.5)/110
* Total crew cost (tcc2) parameter is derived using the employee
entity for all crew on flight by class. Tcc? ?? =
Employee: salary+bene * (Flight: schdhours + 1.5)/110.
Note: tcc = tcc1 st + tcc2nd + tcc3rd
Calculate DE1 (seat) = tcc * (1/ (total no. of seats on plane))
Calculate DE2 (seat) = tcc?? * (1/ (no. of seats occupied in
class))
for each seat.
Grouped by class in rule map.
Step 6: Calculate Provisions for each Seat-The cost of expected future
events are measured here. The airline self insures property, casualty
and
miscellaneous insurance premiums on a per flight basis. And a
provision for future loyalty benefit, a function of loyalty rating,
claimed is made in step 6.
P Type 1:-The cost of the flight's insurance premium is
apportioned to each seat.
Rule
Populated in Step 2 are:
Insurance premium is maintained in the flight entity (total PG)
Calculate P (seat) = Flight: ins~prem * 1/ (total no. seats on
plane)
No grouping in rule map.
P Type 11 : Provision for unusual maintenance cost
is made on a function of the inverse of flight time and takeoffs in
the
last 12 months.
Rule
Populated in Step 2 are:
Financial: periodamt is maintained in the financial entity by
equipment
type.
Total flight hours and last 12 months take-offs are accumulated each
month, their product is tohrs parameter.
Calculate P (seat) = Financial: periodamt * 1/ (total no. of seats on
plane) * (Plane: to~last12 * Flight: schdhrs)/tohrs
No seat grouping in rule map.
P Type III: Providing for future loyalty benefit.
Rule
Populated in Step 2 are:
Customer: bene-miles is maintained using prior periods provision for
benefit miles by loyalty customer * A parameter estimating the usage
rate by loyalty cohart called burn factor
Calculate P (seat) = Flight: distance * burn (loyalty~rating)
Grouping by loyalty rating in rule map.
P Type IV: Future order cancellation reserve.

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Rule
Populated in Step 2 are:
Future airplane order cancellation penalty (pen) and order size (fut
planes)
is maintained in the financial entity
Last 12 months loading is calculated by plane
Calculate P (seat) = pen * (Plane: orig~bal/fut~planes) * 1/ (total
no. seats on plane) * 1/24. where last 12 months loading less than
75%.
Only seats on where last 12 months loading less than 75%.
Step 7: Calculate Indirect Expenses for each Seat-The calculation of
indirect expense is the final step of detailed level profit
calculation. Here remaining cost measures that are not differentiable
by seat are measured.
Fuel and oil, ground costs, regular aircraft maintenance, overheads,
and general marketing expenses are apportioned in IE. The airline also
wants to view customer profitability loaded with the cost of
unoccupied seats.
IE Type/ : General and administrative costs are
apportioned to a seat in this rule.
Rule
Populated in Step 2 are:
The periods financial entity is populated with all of the airlines G &
A
expenses (e.. g., type of G & A are passenger services, navigation
licenses,
rentals, miscellaneous costs, premises and property taxes.) Allocate
these
costs based on seat revenue (NI + OR.)
Calculate IE (seat) sum (Financial: trnamt) * (sum (NI (seat)) + sum
(OR (seat)))/ (Total OR + NI for period)
No seat grouping in rule map for all Financial: type = "G & A".
1E Type// : Ground location costs, airport specific
and gate expenses are apportioned by flight.
Rule
Populated in Step 2 are:
Populate all of these expenses for the period Transactions: tmamt with
the
type being the three letter international airport identifier.
Calculate the number of seats flown to the flight airports during the
profit
period (tfc)
Calculate IE (seat) = sum of Transactions: trnamt *
tfc)/2(1/
Group transactions by pair of airports in flight row for rule map,
where only these types of expenses are included in the tuple.
IE Type III : Fixed asset depreciation is allocated to
a seat.
Rule
Populated in Step 2 are:
The net plane balances (Plane: net orig bal & Plane: impnetbai) are
updated for last period's amortization or write-off.
The amortization factor (function of amortization) given age of asset
(for
both original investment and improvements) is amfo and amfi for each
plane.
# The tax planning estimate for taxable equivalent gross-up, due to
accelerated tax amortization, is. 8 = teg (less than 1 since a tax
credit)
Calculate IE (seat) ( (Plane: net~orig~bal - Plane:orig~bal)

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* amfo) + (Plane: imp~org~bal - Plane : imp~org~bal) * amfi)) * teg *
(1/ (total no. seats on plane)) * (Flight: schd~hrs/
Plane: hrs~last 12/12)
No grouping of seats in rule map.
IE Type IV : Indirect marketing expenses are
apportioned by loyalty class for customer profit aggregations and by
seat for other aggregations.
Rule
Populated in Step 2 are:
# Indirect marketing expense per loyalty tier per flight is
paramterized as
mef???, where??? is 15t, 2nd, 3rd class.
Calculate IE (seat) = mef??? * (1/ (no. of occupied seats in???))
Group seats by class in rule map.
IE Type V : For loyalty investment analysis, allocate
all DE for empty seats to occupied seats equally.
Populated, after all prior steps are caluculated, are the total DE
less OR for
each flight during the period, idef.
Calculate IE (seat) = idef/ (total no. of occupied seats)
Only calculate for occupied seats.
Step 8: Calculate After-tax Seat Profit-The
After-tax Profit :
Rule
Populated in Step 2 are:
The effective tax rate (etr) for the airline is maintained in the
database.
Calculate Profit (seat) = sum (NI (seat) + OR (seat) +DE (seat) + IE
(seat) + P (seat)) * (1-etr)
Each seat is calculated individually, no grouping is used.
Shareholder Value-add : The airline has determined
that some routes have a greater risk of loss due to the volatility of
loading factors. Therefore each route is given a risk factor based on
the last 12 months standard deviation of loading.
Rule
Populated in Step 2 are:
Flight: risk factor is maintained here
* Economic equity per average seat parameter (Flight: risk factor) per
route
Cost of capital rate is paramterized (eqrt)
Calculate SHV (seat) = Profit (seat)- (Flight: risk-factor
eqrt)
Each seat is calculated.
From the foregoing, it will be appreciated that DPM provides a metric
of profit measurement consistent with GAAP at a level of detail that
has not been accomplished using the traditional General Ledger based
data with analytical and/or sample survey based information.
This new ability to resolve profit measures at a detailed level
without using analytical models or statistical extrapolation is a
capability needed throughout industries that find their ability to
determine a marginal decision's profit impact inadequate for
optimization of ownership value. The use of rule driven and database
measurement processes will give large scale businesses a lower cost of
maintenance and technologically scaleable tool to measure profit at a
level of precision or resolution not possible in prior financial
performance measurement processes.
Although a particular embodiment of the invention has been described
in detail for purposes of illustration, various modifications may be
made without departing from the spirit and scope of the invention.
Accordingly, the invention is not to be limited, except as by the

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appended claims.

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## Claims

Claims

WHAT IS CLAIMED IS:
1. A process for determining object level profitability in a
relational database management system, comprising the steps of:
preparing information to be accessed electronically through the
relational database management system;
establishing, in the relational database, rules for processing the
prepared information;
calculating independently at least one marginal value of profit for
each object being measured using the established rules as applied to a
selected set of prepared information;
calculating a fully absorbed profit adjustment value for each object
being measured; and
combining the at least one marginal value of profit and the fully
absorbed profit adjustment value to create a measure for object level
profitability.
2. The process of claim 1, wherein the relational database comprises
a structured query language (SQL).
3. The process of claim 1, wherein the preparing step includes the
step
of extracting, conditioning and loading object attribute values into
the
database.
4. The process of claim 1, wherein the preparing step includes the
steps of extracting, conditioning and loading financial statement
attribute
values into the database.
5. The process of claim 1, wherein the preparing step includes the
steps of extracting, conditioning and loading event attribute values
into the
database.
6. The process of claim 1, wherein the preparing step further includes
the step of calculating opportunity values of funds used or supplied
by each object being measured.
7. The process of claim 1, wherein the establishing step includes the
steps of providing the information necessary to select objects, and
performing the correct profit calculs.
8. The process of claim 1, wherein the step of calculating at least
one marginal value of profit includes the steps of calculating net
interest (NI), other revenue (OR) and direct expense (DE), wherein net
interest (NI) is the summation of interest income, value of funds
provided and earnings on equity funds used less the sum of interest
expense and costs of funds used, other revenue (OR) is a measure of
profit contribution from non-interest related sources, and direct
expense (DE) is the profit value reduction due to marginal resource
consumption by the object.
9. The process of claim 1, wherein the step of calculating at least
one marginal value of profit includes the step of provisioning (P) for
the selected set of prepared information, provisioning being the
expected profit value adjustment for future outcomes related to the

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object.

10. The process of claim 9, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other

revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other.

revenue (OR) is a measure of profit contribution from non-interest related

sources, and direct expense (DE) is the profit value reduction due to marginal

resource consumption by the object.

11. The process of claim 10, wherein the step of calculating a fully absorbed profit adjustment value includes the step of calculating the value for indirect expense (IE) which is an apportioned profit value adjustment for all non-object related resource consumption.

12. The process of claim 11, wherein the combining step includes the steps of adding net interest (NI) and other revenues (OR), and subtracting therefrom direct expense (DE), provisioning (P) and indirect expense (IE).

13. The process of claim 12, including the step of adjusting the measure for object level profitability for taxes and/or object economic value.

14. The process of claim 1, wherein the at least one marginal value of profit is calculated in parallel.

15. The process of claim 1, wherein the fully absorbed profit adjustment value is calculated utilizing the calculated at least one marginal value of profit.

16. A process for determining object level profitability in a relational

database management system, comprising the steps of:

repairing information to be accessed electronically through the relational database management system;

establishing, in the relational database, rules for processing the prepared information;

calculating independently at least one marginal value of profit for each

object being measured using the established rules as applied to a selected set

of prepared information;

calculating a fully absorbed profit adjustment value including value adjustments for taxes and/or object economic value; and

combining the at least one marginal value of profit and the fully absorbed profit adjustment value to create a measure for object level profitability.

17. The process of claim 16, wherein the relational database comprises a structured query language (SQL).

18. The process of claim 16, wherein the preparing step includes the step of extracting, conditioning and loading object attribute values into the database.

19. The process of claim 18, wherein the preparing step includes the steps of extracting, conditioning and loading financial statement attribute values into the database.

20. The process of claim 19, wherein the preparing step includes the steps of extracting, conditioning and loading event attribute values into the database.

21. The process of claim 20, wherein the preparing step further includes the step of calculating opportunity values of funds used or supplied

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by each object being measured.
22. The process of claim 16, wherein the establishing step includes the
steps of providing the information necessary to select objects, and performing
the correct profit calculs.
23. The process of claim 16, wherein the step of calculating at least
one marginal value of profit includes the steps of calculating net interest (NI),
other revenue (OR) and direct expense (DE), wherein net interest (NI) is the
summation of interest income, value of funds provided and earnings on
equity funds used less the sum of interest expense and costs of funds
used, other revenue (OR) is a measure of profit contribution from
non-interest related sources, and direct expense (DE) is the profit
value reduction due to marginal resource consumption by the object.
24. The process of claim 16, wherein the step of calculating at least
one marginal value of profit includes the step of provisioning (P) for
the selected set of prepared information, provisioning being the
expected profit value adjustment for future outcomes related to the
object.
25. The process of claim 24, wherein the step of calculating at least
one marginal value of profit includes the steps of calculating net
interest (NI), other revenue (OR) and direct expense (DE), wherein net
interest (NI) is the summation of interest income, value of funds
provided and earnings on equity funds used less the sum of interest
expense and costs of funds used, other revenue (OR) is a measure of
profit contribution from non-interest related sources, and direct
expense (DE) is the profit value reduction due to marginal
resource consumption by the object.
26. The process of claim 25, wherein the step of calculating a fully
absorbed profit adjustment value includes the step of calculating the value for
indirect expense (IE) which is an apportioned profit value adjustment for all
non-object related resource consumption.
27. The process of claim 26, wherein the combining step includes the
steps of adding net interest (NI) and other revenues (OR), and subtracting
therefrom direct expense (DE), provisioning (P) and indirect expense
(IE).
28. The process of claim 16, wherein the at least one marginal value
of profit is calculated in parallel.
29. The process of claim 16, wherein the fully absorbed profit
adjustment value is calculated utilizing the calculated at least one
marginal value of profit.
30. A process for determining object level profitability in a
relational database management system, comprising the steps of:
preparing information to be accessed electronically through the
relational database management system, including the step of
calculating opportunity values of funds used or supplied by each
object being measured;
establishing, in the relational database, rules for processing the
prepared information;
calculating independently at least one marginal value of profit for
each object being measured using the established rules as applied to a
selected set of prepared information;
calculating a fully absorbed profit adjustment value for each object
being measured; and
combining the at least one marginal value of profit and the fully

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absorbed profit adjustment value to create a measure for object level profitability.

31. The process of claim 30, wherein the relational database comprises a structured query language (SQL).

32. The process of claim 30, wherein the preparing step includes the step of extracting, conditioning and loading object attribute values into the database.

33. The process of claim 32, wherein the preparing step includes the steps of extracting, conditioning and loading financial statement attribute values into the database.

34. The process of claim 33, wherein the preparing step includes the steps of extracting, conditioning and loading event attribute values into the database.

35. The process of claim 30, wherein the establishing step includes the steps of providing the information necessary to select objects, and performing the correct profit calculs.

36. The process of claim 30, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI), other revenue (OR) and direct expense (DE), wherein net interest (NI) is the summation of interest income, value of funds provided and earnings on equity funds used less the sum of interest expense and costs of funds used, other revenue (OR) is a measure of profit contribution from non-interest related sources, and direct expense (DE) is the profit value reduction due to marginal resource consumption by the object.

37. The process of claim 30, wherein the step of calculating at least one marginal value of profit includes the step of provisioning (P) for the selected set of prepared information, provisioning being the expected profit value adjustment for future outcomes related to the object.

38. The process of claim 37, wherein the step of calculating at least one marginal value of profit includes the steps of calculating net interest (NI),
other revenue (OR) and direct expense (DE), wherein net interest (NI) is the
summation of interest income, value of funds provided and earnings on equity
funds used less the sum of interest expense and costs of funds used, other
revenue (OR) is a measure of profit contribution from non-interest related
sources, and direct expense (DE) is the profit value reduction due to marginal
resource consumption by the object.

39. The process of claim 38, wherein the step of calculating a fully absorbed profit adjustment value includes the step of calculating the value for indirect expense (IE) which is an apportioned profit value adjustment for all non-object related resource consumption.

40. The process of claim 39, wherein the combining step includes the steps of adding net interest (NI) and other revenues (OR), and subtracting therefrom direct expense (DE), provisioning (P) and indirect expense (IE).

41. The process of claim 40, including the step of adjusting the measure for object level profitability for taxes and/or object economic value.

42. The process of claim 30, wherein the at least one marginal value of profit is calculated in parallel.

43. The process of claim 30, wherein the fully absorbed profit adjustment value is calculated utilizing the calculated at least one marginal value of profit.

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